Effects of Music on Mood During Basketball Play in Junior High School Physical Education

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Abstract

The incorporation of music in the physical education environment, during physical activity have been shown to be beneficial for participants. Lane (1999) created a conceptual framework focusing on asynchronous music, identifying four factors important to a given piece of music: 1) rhythm response, 2) musicality, 3) cultural impact, and 4) association. The study purpose was to investigate two conditions, with/without the incorporation of music, in the physical education environment on student moods in 948 junior high school students (501 males & 447 females) measured utilizing the Profile of Mood States (POMS) Short Form. Significant differences were observed in the mean scores of POMS between pre-intervention (without music) and post-intervention (with music) for total mood disturbance, tension, anger, fatigue, depression and confusion (all P-values < 0.0001), and significantly higher mean scores observed for esteem related affect and vigor (P-values < 0.0001). Results from this study and others, provide an impetus for physical education teachers and physical education teaching education (PETE) in incorporating music during games/activities for the purpose of improving student moods and subsequent activity levels.

Key Words: Music, Physical Education, POMS-Short Form, Mood
Introduction

A goal for education across all content areas is to create a positive learning environment that will give students opportunities to learn. One opportunity educators have, and continue to use, to assist in student learning is music. Wilkinson (2013) stated that having the “right kind of music” in educational settings has great promise in aiding students in retention and learning. Additionally, Wilkinson (2013) continues by maintaining that the right kind of music has the potential to reduce stress, lessen depression and anxiety, improve mood, and enhance a sense of comfort and relaxation. Haslam and Price (1998) found a significant difference ($t (-4.7) = 8.0, p < .002$) in math performance mean score when background music was playing ($M = 38.5, SD = 15.1$) compared to the absence of background music ($M = 21.5, SD = 8.91$).

O’Sullivan (2018) reviewed previous research related to the Mozart Effect in the classroom and its effects on student moods in relation to learning. The Mozart Effect is associated with the temporary enhancement of spatial-temporal reasoning abilities immediately after listening to a piece of music by Mozart (Ivanov and Geate, 2003). After review of Mozart Effects studies, the investigator established that the original premise of the Mozart Effect could not be verified, yet there was considerable evidence that background music may impact the learning environment (O’Sullivan, 2018). O’Sullivan (2018) continued by stating that judicious choices should be made based on the audience (i.e., students) interaction.

Incorporation of Music in the Physical Education Learning Environment

Music incorporated in a physical activity setting has been shown to be beneficial for the participant (Barney, Gust, & Liguori, 2012; Karageorghis, Jones, & Stuart, 2008; & Karageorghis & Terry, 1997). In reviewing music’s role in physical activity, Karageorghis, Terry and Lane (1999) created a conceptual framework focusing on asynchronous (i.e., absence of
conscious synchronization between physical movement and accompanying musical rhythm) motivational (i.e., stimulates or inspire physical activity) music in the context of exercise and sport. Within this framework, four factors have been identified contributing to the qualities of a given piece of music: 1) rhythm response, 2) musicality, 3) cultural impact, and 4) association. Rhythm response is the response to the rhythmical elements of music; key characteristics of music for eliciting a bodily response. Musicality is the response to the pitch-related elements of music, specifically harmony and melody. Cultural impact is the pervasiveness of the music within society (i.e., the more culturally central music is within society). Finally, association is specific to music evoking physical activities in individuals. Karageorghis et al. (2006) proposed asynchronous motivational music leads to three psychophysical responses namely, arousal control, reduced ratings of perceived exertion (RPE), and improving moods.

Listening to music during physical activity has been associated with longer workout times and training at higher intensities. Barney, Gust, and Liguori (2012) surveyed the relationship of music during workouts in college-aged students. Results indicated college-aged students participated in activity for longer periods and at higher intensities when listening to music. Barney and Prusak (2015) further investigated the relationship of music during physical activity. Researchers examined the effects of music on physical activity rates in an elementary physical education class (3rd, 4th, & 5th graders), measured with pedometers, during walking and frisbee activities. Results indicated that, on average for walking activities, males took 377 more steps than their female student counterparts music played. For frisbee activities, male students took an average of 604 more steps than female students (370 steps) throughout the lesson when music played. Brewer, Barney, Prusak, and Pennington (2016) conducted a similar study with music and no music with junior high school-aged physical education students participating in
volleyball and basketball. On average, male students acquired 41 more steps during volleyball and 220 more steps during basketball while music was playing. On average, female students acquired more steps 380 during volleyball game play and 345 more steps during basketball with music playing.

Music during physical activity may also affect a person’s mood. Hayakawa, Miki, Takada and Tanaka (2000) identified music’s association to physical activity and a person’s mood state. Hayakawa, et al., evaluated the mood states of 16 subjects aged 32-60 years (M = 49.9, SD 7.5) subjects’ mood states utilizing the abbreviated version of the Profile of Mood States (POMS) (Grove & Prapavessis, 1992). For this study, Hayakawa et al., (2000) compared synchronous music and Japanese traditional folk song to no music during exercise. Significant scale items specific to vigor ($F_{2.30} = 3.64, p<.001$), fatigue ($F_{2.30} = 5.72, p<.01$), and confusion ($F_{2.30} = 3.12, p<.10$) were identified related to the type of music, or no music, and exercise.

Findings also indicated participants reported more positive mood traits when synchronous music played compared to when no music played. Investigators continued by saying that between the two types of music (synchronous and traditional Japanese music), synchronous music generated more positive moods in participants. Barney, Pleban and Gishe (2016) also investigated the effects of music on fourth grader student’s enjoyment in two activities during physical education class. Fourth grade students participated in two separate lessons, one with music and one without music. Fourth grade students perceived physical education as more enjoyable when music was playing during the lesson, when compared to lessons without music. However, qualitative follow-up data from student interviews indicated music’s association with mood. From the qualitative results, one student stated, “I love PE class, but when the music was playing it made what we were doing in class funner.” Another student stated, “The songs were awesome. I was
singing along.” Student comments did not specifically mention mood, yet mentioned factors that would impact mood, such as having fun and singing. Barney and Pleban (2018) qualitatively examined 26 physical education teachers’ (year’s teaching experience 1-25 years) perceptions of utilizing contemporary music in the classroom. Transcript reviews revealed four major themes regarding the incorporation of music in the PE environment: 1) classroom management, 2) student learning, 3) class climate, and 4) music as a motivational tool. Within the major themes, additional sub content factors, 11 total across all four major themes, were identified (Table 1). The purpose of this present study was to investigate two conditions, with/without the incorporation of music, in the physical education environment on student moods.

Methods

Participants

For this study, 948 junior high school students (501 males & 447 females) from one intact junior high school in the Intermountain West were sampled. Student ages ranged from 11 to 15 years. Junior high grade levels were comprised of 7th, 8th, and 9th grade. Stratified by grade level, 330 7th graders, 322 8th graders, and 296 9th graders comprised this study. Across all grades, stratified by race/ethnicity, students self-identified as: 669 (70.6%) Caucasian, 205 (21.6%) Latino/Hispanic, 32 (3.4%) Pacific Islander, 13 (1.4%) African American, and 10 (1.1%) Native American.

Instrumentation
The instrument used for this study was an abbreviated version of the Profile of Mood States (POMS) (Grove & Prapavessis, 1992). The original POMS self-report survey was created by McNair, Lorr and Dropleman (1971) which incorporated descriptive words that define feelings people have at a certain point in time. Subjects self-reported on each descriptive word adjective using a 5-point Likert scale (0=Not at all, 1=A little, 2=Moderately, 3=Quite a Lot, and 4=Extremely). The survey instrument consisted of 40 mood adjectives. University Institutional Board (IRB) and school district approval was obtained prior to study implementation. All participants were subsequently assured that their voluntary decision to participate or not participate in the study would not affect their grade in class or class standing.

**Setting**

Prior to study implementation, the investigators contacted the junior high school physical educators, explaining both the purpose of the study and the survey instrument. Prior to data collection, the researchers instructed each junior high school physical educator on proper survey administration. The school’s classes ran on block schedule, A-day/B-day with each class lasting approximately 80 minutes in length, from bell to bell. Explanation, administration, and survey completion took approximately 15 minutes. A 99% survey response rate was recorded.

**Research Design**

Convenience sampling was employed to collect data for this study. The study was quasi-experimental, comparing two conditions, with/without the incorporation of music, during one class activity (basketball) in the physical education environment on students’ mood. The Profile of Mood States (POMS)-Short Form is a psychological rating scale measuring six distinct mood states over time. Advantages of incorporating the POMS-Short Form include ease of instrument administration and quick assessment of the five-point scale. The short form of the assessment
was developed principally for administration to children and young adults, thus factoring into its inclusion in the current study. Abbreviated POMS self-report data were collected from each of the 948 participants. All data analyses were conducted using SAS software, Version 9.4 of the SAS System for Windows (SAS Institute Inc., Cary, NC, USA).

**Results**

**Profile of Mood States**

A significant difference was observed in the mean scores of POMS between pre-intervention (without music) and post-intervention (with music) (Table 2). Post intervention group showed significantly lowered mean scores for total mood disturbance, tension, anger, fatigue, depression and confusion (all P-values < 0.0001), while significantly higher mean scores was observed for esteem related affect and vigor (P-values < 0.0001).

| Insert Table 2 Here |

**Profile of Mood States by Demographic Characteristics**

Total mood disturbance mean score showed improvement for all demographic characteristic groups post intervention, and no statistically significant difference was observed among the groups: gender (P-value = 0.1135), ethnicity (P-value=0.6569) and grade (P-value=0.0611) (Table 3). Pre intervention, 7th grade students had the lowest total mood disturbance mean score, while 9th grade students had the highest.

| Insert Table 3 Here |
The purpose of this present study was to investigate two conditions, with/without the incorporation of music, in the physical education environment on student mood during basketball play. Present study findings suggests that music incorporated in the physical education environment may positively impact student moods. Paired sample t test data revealed seven moods (tension, anger, fatigue, depression, esteem-related affect, vigor and confusion) were positively affected when music was incorporated in this sample of junior high school physical education students during basketball play. POMS-Short Form data indicated that when the intervention of music was compared to no music, positive self-reported responses to vigor adjectives were noted. Barney, Pleban and Gishe (2016) studied the effects of music on fourth grade student’s enjoyment in two activities (toss/catch with music and hula hoop activities with no music). From qualitative interview data students stated music “gives me more energy. I know I was working harder,” and when music was playing one student reported that it got him “pumped up.” Barney and Pleban (2018) studied PE teacher’s perceptions of incorporating music in physical education lessons; qualitatively evaluating the influence of music on the classroom environment. Teachers voiced music positively affected the class climate. Some of the responses that were expressed were, “I believe music has a strong influence over our emotions, so if I’m playing happy upbeat music, my students are happy and active,” and “If a student comes in upset from another class, listening to a song they really like it can help change their mood from negative to positive, as they associate the song with happy uplifting feelings.” Other words and/or phases captured, included: “happy,” happier,” “more excited,” and “upbeat mood.” To note, Hayakawa et al., (2000) compared synchronous music and Japanese traditional folk song to no music during exercise and evaluated the mood states of 16 subjects aged 32-60
years (M = 49.9, SD 7.5). Significant scale adjectives specific to vigor and confusion were reported. These findings, along with present study finds related to items of vigor and confusion, may suggest more positive mood characteristics when music is played compared to when no music played. In addition, Haslam and Price (1998) speculated music may have positive application outside the physical education environment, in other academic classroom settings (e.g., math). However, it may be hypothesized for mood to be positively impacted by the incorporation of music, attention should be given to the aforementioned for factor framework contributing to the qualities of a given piece of music (1. rhythm response, 2. musicality, 3. cultural impact, and 4. association).

**Study Implications**

Seven mood scale items (tension, anger, fatigue, depression, esteem-related affect, vigor and confusion) were identified as been positively affected when music was playing in the physical education classroom. With the results from this study, physical education teachers should consider implementing music during games/activities for the purpose of improving student moods and subsequent activity levels. Another implication from this study is specific to physical education teaching education (PETE) programs and PETE majors. Study concepts may be implemented when PETE majors are immersed in their methods of teaching PE courses. After didactic instruction PETE majors participate, and subsequently incorporate music, during their practicums and student teaching experiences.

**Study Limitations**

This study examined self-reported mood responses without incorporating biophysiological measures, Borg Scale ratings of perceived exertion (RPE), or pedometer step counts. In addition, investigators have noted a number of limitations placed upon this study. For
this study, the participants came from one intact junior high school. Because the participants came from one school, findings may not be generalized or reflective of junior high school students in other junior high schools or junior high schools in other geographic regions.


Table 1. List of Major Physical Education and Music Interview Themes with Sub-content Factors (from Barny & Pleban, 2018)

<table>
<thead>
<tr>
<th>Major Themes</th>
<th>Sub Content Factors</th>
</tr>
</thead>
</table>
| 1) Classroom Management | - Starting Activities  
                        | - Stopping Activities  
                        | - Student Listening Queue |
| 2) Student Learning | - Student Focus on Learning  
                        | - Student Comfort with Learning Activity |
| 3) Class Climate | - Student Preference for Contemporary Music  
                        | - Creation of a Positive Classroom Atmosphere  
                        | - Establishment of Positive Student Mood |
| 4) Music as a Motivational Tool | - Behavioral Reward  
                        | - Student Engagement  
                        | - Positive Messaging |

Note: DOI: [https://doi.org/10.18666/TPE-2018-V75-I2-7447](https://doi.org/10.18666/TPE-2018-V75-I2-7447)

Table 2. Scores of Abbreviated Profile of Mood States (POMS) Comparing pre (without) and post (with) Music during Junior High School Basketball Play

<table>
<thead>
<tr>
<th></th>
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<th></th>
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</thead>
<tbody>
<tr>
<td>Total Mood Disturbance</td>
<td>7.8±1.00</td>
<td>-12.6±0.69</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Tension</td>
<td>5.2±0.22</td>
<td>2.3±0.16</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Anger</td>
<td>5.1±0.23</td>
<td>1.9±0.15</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Fatigue</td>
<td>4.7±0.17</td>
<td>2.8±0.14</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Depression</td>
<td>5.9±0.29</td>
<td>1.7±0.16</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Esteem-related Affect</td>
<td>11.5±0.16</td>
<td>14.2±0.18</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Vigor</td>
<td>5.6±0.19</td>
<td>8.4±0.21</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Confusion</td>
<td>4.0±0.19</td>
<td>1.4±0.13</td>
<td>&lt;.0001</td>
</tr>
</tbody>
</table>

[1] Mean ± Standard Error  
[2] Paired sample t test
Table 3. Scores of Abbreviated Profile of Mood States (POMS) Comparing pre (with out) and post (with) Music during Junior High School Basketball Play by Demographic Characteristics

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>7.5±1.24</td>
<td>-11±0.99</td>
<td>0.1135</td>
</tr>
<tr>
<td>Female</td>
<td>8.1±1.63</td>
<td>-14±0.97</td>
<td></td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>African American/Asian/Native American/Pacific Islander</td>
<td>7.2±3.45</td>
<td>-9.6±2.65</td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>8.3±1.17</td>
<td>-13±0.83</td>
<td>0.6569</td>
</tr>
<tr>
<td>Latino/Hispanic</td>
<td>6.0±2.28</td>
<td>-13±1.51</td>
<td></td>
</tr>
<tr>
<td>Grade</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7th Grade</td>
<td>4.3±1.74</td>
<td>-13±1.25</td>
<td></td>
</tr>
<tr>
<td>8th Grade</td>
<td>9.1±1.63</td>
<td>-14±1.05</td>
<td>0.0611</td>
</tr>
<tr>
<td>9th Grade</td>
<td>10.4±1.79</td>
<td>-11±1.37</td>
<td></td>
</tr>
</tbody>
</table>

[1] Mean ± Standard Error
[2] ANOVA test